DEPARTMENT OF THE ARMY
FRANKFORD ARSENAL
PHILADELPHIA, PENNSYLVANIA 19137

IN REPLY REFER TO:
COMMANDING OFFICER
FRANKFORD ARSENAL
ATTN: SMUFA- C4000

19 June 1968

Mr. Howard Roffman
8829 Blue Grass Road
Philadelphia, Pa. 19115

Dear Mr. Roffman:

A letter from Mr. Charles H. Williams, Principal, Abraham Lincoln High School, dated 10 June 1968, requested permission for you to visit Frankford Arsenal and further an investigation of the John F. Kennedy Assassination.

It is our impression, both from Mr. Williams' letter, and from conversations with your father, that you are seeking information on ballistics. Certainly, we have personnel capable of supplying such ballistic information though only in a general or theoretical fashion, since our experience is in the area of U. S. Army weapons. It must be understood that we have no first-hand knowledge of the weapon type used in the assassination.

Accordingly, Mr. Charles M. Dickey of our Small Caliber Ammunition Development Laboratory, will make himself available for your visit on Monday, 24 June or Friday, 28 June 1968. Mr. Dickey is a recognized expert in his field and should be able to assist you.

We suggest that you select a date which is most convenient to you and plan to arrive at our main gate, located on Bridge Street, just East of Tacony Street, during the morning hours, preferably around 10:00 A.M.

You may make the appointment by telephone, with this office, on JEfferson 5-2900, extensions 21259 or 7143. If another person will accompany you, we shall require that person's name and his or her relationship to you.

SMUFA-C4000
Mr. Howard Roffman

19 June 1968

We regret the delay in answering your inquiry but trust you will realize that our professional personnel are engaged in vital defense work and not readily available for interview.

Sincerely,

WILLIAM E. LENNOX
Information Officer

Copy Furnished:
Mr. Charles H. Williams

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that it was. Sometimes it can happen.

Mr. Roffman. This is the bullet that was fired into the wrist (showing picture of C.E.856). Now, this was at full velocity, head on into a human wrist. The damage that was produced was much greater than the damage produced to Governor Connally's wrist but the bullet emerged with its nose completely flattened-pushed in and torn on its side.

Mr. Dickey. There's something that you probably ought to recognize and that is when bullets enter cavities like the body, a shock cavity is formed. This is not - this is well known, and this cavity is many times the size of the bullet. The bullet can pass through in - relatively unimpeded, but the cavity, the temporary cavity formed, can strike a bone and perhaps fracture it or break it or something like that whereas the bullet never touched it. Now in the case here it probably did shatter that because it's a small part of the arm but the bullet that presumably went through Kennedy's neck-shoulder area- to Connally's chest...

Mr. Roffman. Right chest.

Mr. Dickey. Right chest, need not have struck the rib in order to break it. It might have passed through flesh entirely.

Mr. Roffman. The rib was not broken; the rib was torn. It was removed. There was 10cm of rib removed and it was lacerated along - pieces were found inside the lung and along the muscle.

Mr. Dickey. Anyway, this shock cavity can do a lot of damage without the bullet having touched the bone.

Mr. Roffman. Do you think that the loss of velocity would permit the bullet from doing this damage? After exiting from Kennedy then exiting from Connally's chest, do you think it had the velocity to produce the wound in....

Mr. Dickey. Yeah....

Mr. Roffman. And then go on to produce the wound in the thigh - just lodge in the thigh? Now, when the tests were conducted, it was found that when the bullet exited from the goat chest, it was tumbling because it hit the silk screen on its side. So, by this time, the bullet had begun to tumble. Do you think that this theory of the bullet going through both men is more acceptable if we have the bullet entering from its rear and tumbling through that way than just entering head on? Look at the damage produced by this bullet (referring to damage done in test shown in C.E.854).

Mr. Dickey. I wouldn't say that it would necessarily be more acceptable.

Mr. Roffman. See now, after exiting from the gelatin block, it still hadn't begun to tumble that much. It was still in a relatively straight....

Mr. Dickey. But you must remember that that's another test on a different bullet and these bullets operate in a statistical fashion and what would happen in one case might not necessarily happen again with another bullet that was fired from the exactly duplicated circumstances. They don't repeat themselves in a very uniform manner.

Mr. Roffman. I see. Do you think, then, these tests would be valid in supporting this theory or destroying it? Do you think they have much bearing on it?

Mr. Dickey. Now, what theory are you referring to?

Mr. Roffman. The theory that 399 went through both men.

Mr. Dickey. Well, I don't think that they destroy that theory.

Mr. Roffman. Do you think, though, that they could be used as evidence to support it because that...ah...3 different bullets were used with 3 different shots and then put together mathematically, so to speak. In other words, all 3 - the wrist, the chest, and the neck- weren't lined up like they were during the assassination. It was 3 separate shots. The velocities were measured and then subtracted from each other. They still found that the bullet had enough velocity in that hypothetical situation to go on to produce the wound of the thigh. Do you feel that is a valid way to estimate whether the bullet could have done the damage or not?

Mr. Dickey. Well, under the circumstances, that's certainly one way. I wouldn't be able to - I don't see anything wrong with it.

Mr. Roffman. The biggest factor that seems to discredit the theory of the shot lodging in the back is the velocity of the bullet. Because obviously if the bullet was fired at its maximum velocity or even its regular velocity, it obviously wouldn't lodge in the shoulder. Would you agree with that? That the bullet fired from this rifle at approximately 2,000 f.p.s. would just lodge in the soft tissues of the shoulder and not penetrate more than 1 or 2 inches?

Mr. Dickey. I'd rather expect it to go on through. You see, the fact that the hole in the man closed up would mean that perhaps muscles would be able to move in places where they normally wouldn't be.

Mr. Roffman. This theory was advanced that - it was advanced by Josiah Thompson - that maybe the bullet, 399, came from a cartridge case that didn't have normal explosive power. I'll find it the way he worded it here. That will help much more.

Mr. Dickey. Well this means, lower velocity, would mean that it could have a different trajectory from the others. It means then that the weapon wouldn't be sighted in. It was....

Mr. Roffman. Do you mean....

Mr. Dickey. Operating at a lower velocity. It would fall sooner and he'd have to allowed for it in order for it to hit the target.

Mr. Lennox. He would have had to know that....

Mr. Roffman. Let me show you the reconstruction picture here. Maybe this will help you. Tests fired with the rifle showed that because of its - there was something wrong with the scope. The way it was alligned, the shots would hit a little bit high and to the right. This was founded by tests.

Mr. Lennox. He was compensating in firing knowing this about the scope. Is that true?

Mr. Roffman. There's no knowledge of whether he knew this or not. This is a picture taken through the scope at a time when a tree, part of the foliage in front of the Depository, not blocked the assassin's view of the motorcade but screened it (showing C.E.~~186~~ 891). He could still track the car but there's a chance that the shot fired through this would be deflected. Let me explain more thoroughly. In reconstructing the assassination, the F.B.I. found that from frame 161 before the shots were fired as the car had just rounded the corner beginning to turn - go down Elm Street, the car went under the view of the tree and continued here. Now in stop action, there is a slight opening in the tree at frames 185 and 186 where the President's back came into view again. Let me stress here, though, that the back is not blocked out. It's not completely blanked out by the tree. It's obscured a certain degree but it can still be tracked. Now, the tree - This continues. At frame 207, though the car emerged from this foliage and from then on it is a clear shot till all the way down to the time of the head shot, here. Now there's not much change in the position of the President and the Governor between 186 and 210 so I'll show you 210 here to ask you a question that I want(showing C.E.893). The assassin was aiming at the President's head at this point. He fired the shot and the shot was below its regular explosive capability in that its velocity was much slower. Would the drop be consistent by entering this point (referring to chalk mark on back of President's stand in) or would you expect a much further drop?

Mr. Dickey. Well, let's see. The drop would be in the order off what, six inches?

Mr. Roffman. From here, the President's head to his back here. In fact the bullet hole would probably be lower, let's say in the area of here. This is only a drawing made several months after the autopsy (showing C.E.386).

Mr. Lennox. The drop was on the order of six inches.

Mr. Dickey. Drop on the order of six inches.

Mr. Roffman. I think it would be more than 6 inches. Probably between 9, about 9.

Mr. Dickey. Well, let's take a look at you.

Mr. Roffman. I think it would be more accurate on an adult male.

Mr. Dickey. Yeah, but I mean....

Mr. Roffman. See, there's no way of knowing that that's the actual point....

Mr. Dickey. Six inches isn't a bad one, seven inches, but 9 inches would certainly be quite long.

Mr. Lennox. If you want to measure on me.

Mr. Roffman. See, I think 9 inches here on an adult male... The assassin wouldn't necessarily be aiming for a point that low on the head.

Mr. Dickey. It's hard to say because, after all....

Mr. Roffman. Also, at the time of the head shot, the head was bent down.

Mr. Lennox. Eight inches.

Mr. Roffman. Let's say a drop between 7 and 9 inches. Would that be consistent....

Mr. Lennox. 7 to 9 inches at 100 yards.

Mr. Roffman. It's not 100 yards. The distance here was 156.3ft.

Mr. Lennox. 156 feet. It's approximately 50 yards we're talking about now. We're talking about a velocity drop off of somewhere between 6 and 9 inches.

Mr. Dickey. That difference could be accounted for by a lot of things. It could be accounted for by aiming error which from our experience is probably the largest error as far as the man is concerned.

Mr. Roffman. Do you think it's accountable though....

Mr. Dickey. It is possibly accounted for by - you mean a low load?

Mr. Roffman. Yeah

Mr. Dickey. A light load? Yes, it could be accounted for in part by a light load, too. But that's not as likely as an aiming error.

Mr. Roffman. Thompson here says that:

(1) Bullet 399 is an atypical projectile. None of the other bullets fired from Oswald's rifle at standard muzzle velocity preserved their pristine state after hitting anything. Even one of the two ballistics comparison rounds - projectiles fired into long tubes of cotton waste - was twisted along a longitudinal axis.

(2) The wound in the President's back was an atypical wound. Dr. Boswell told me that its depth could be probed only up to the first or second knuckle of the little finger - a depth of 1 to 2 inches. According to the Sibert-O'Neill report, the bullet penetrated downward at an angle of 45 to 60 degrees - an angle inconsistent with any possible trajectory from a building in Dealey Plaza. Copper traces around the coat and shirt indicate the wounding projectile was copper-jacketed. The dimensions of this wound (4 by 7 mm) match exactly the dimensions of the tailend of C.E.399.

(3) The ammunition used in the rifle found on the sixth floor of the Depository was government surplus ammunition last manufactured in 1944. A spokesman for the company that manufactured the ammunition declared that "the reliability of such ammunition would be questionable today."

(4) At least fifty-two witnesses reported that the first shot sounded more like a "firecracker" or a "backfire" than a rifle shot. Taking the Secret Service agents as a group familiar with firearms, we find that agents Bennett, Hickey, Hill, Kellerman, Kivett, Ready, Taylor, and Youngblood all took the first shot for a "firecracker", while Greer thought it was a "backfire". Kellerman recalled the sound of the first shot as "a report like a firecracker, pop", while Kivett remembered that "it sounded more like an extremely large firecracker, in that it did not seem to have the sharp report of a rifle".

What Kellerman heard as "a report like a firecracker, pop" may have been the report of a "short charge" - that is, a cartridge whose explosive power was far less than standard. Such a supposition would explain many things in addition to its odd, firecracker-like sound. It would explain why the first shot (the shot we would normally expect to be most accurate) missed, and why it missed by falling nearly a foot low. It would explain the copper traces on the President's jacket as well as the "fine striations" on the tip of 399. The very low muzzle velocity of such a projectile would explain the pristine character of the bullet as well as the otherwise inexplicable short penetration into muscle. (Six Seconds in Dallas, pp. 166 - 168)

Now, from what I've just read, do you think it's conceivable that this is the case - that this is what happened or could have happened?

Mr. Dickey. Yes, it's conceivable that that could happen.

Mr. Roffman. Are these "short charges" that he describes, are they common?

Mr. Dickey. No, they are not common, not at all.

Mr. Roffman. What would cause a short charge such as this?

Mr. Dickey. Well, a light powder charge would cause it. I'm not familiar with the loading equipment that somebody used and they may not have adequate means of checking their cartridge although I would feel sure they probably would.

Mr. Roffman. He says here that a spokesman for the company declared that "the reliability of such ammunition would be questionable today."

Mr. Dickey. Well, another factor is that the propellant might not be stable. It might - for example, manufactured in '44 and fired in '63, that's 19 years. Well by and large, our propellants are stable for periods longer than that. Some of our propellants were stable for periods of longer than 30 years, but there again, I wouldn't be able to say for the type of propellant.

Mr. Lennox. There are so many variables here again. The primer mix,....

Mr. Dickey. The fire might go bad.

Mr. Roffman. Now, there's another theory in connection with this. It involves speculation but perhaps you could help me with this because it is really in the field of ballistics.

Three cartridge cases were found by the window on the sixth story of the Book Depository and in the rifle there was one more cartridge case with a bullet in it. It was an unfired round. Now, two of the cartridge - all three were identified by the firing pin marks on the back as being fired from this rifle. (referring to C.E. 139). Two of them have a mark on the side and the one in the chamber had a mark on the side which Thompson says is the "chambering mark" produced by the characteristics of the chamber of the rifle. Now this one cartridge case does not have a chambering mark but the peculiar characteristic about this cartridge case is the dent on its lip. And in this picture here that I had the Archives make up for me, you can see, this is directly looking at that case from the front, this is the dent on the lip. Now, is it possible that this could have held a bullet at the time on November 22, 1963, and fired it. Is that still possible even though it has the dent here?

Mr. Dickey. Oh yes - because that could happen after the cartridge was fired. It could have struck - of course you say it doesn't have a typical dent mark caused by the chambering. Well, maybe....What's this spot right here? It looks like it right here. A mark, a dent like this on the lip of a case can happen after a case is ejected, after it's been fired. It could have struck something relatively sharp to produce that because you see that metal is only 11, 12 thousandths of an inch thick. It's brass; it's soft.

Mr. Roffman. He's thrown, he's thrown cases like this. It says, "I have thrown hundreds of similar cases against the wall and never succeeded in denting one."

Mr. Dickey. We've seen cases like that ourselves.

Mr. Lennox. Many, many, many, many.

Mr. Roffman. Well, supposing this dent was here while the bullet was in it. Is it possible to get a dent like that while it's still carrying a projectile?

Mr. Dickey. Unlikely because the projectile is round and that dent wouldn't be present.

Mr. Roffman. O.K.. Is this significant at all? The fact that he dent in 399 here is so similar to the dent in the cartridge case?

Mr. Dickey. No, I don't think so.

Mr. Roffman. It would bear no signifigance at all?

Mr. Dickey. I don't think so.

Mr. Roffman. Is it at all possible that this cartridge case held 399 and it was round but in firing or in moving the cartridge case into the chamber with the bolt that the chambering mark - in firing, the chamoering mark was placed high as the bullet was firing - cause the bullet to lose velocity? Is that at all possible?

Mr. Dickey. I don't think I follow you. Let me see if I can reconstruct what you said. It is possible to - chambering 399 in this particular cartridge case in this rifle and a peculiar set of circumstances would occur which would give rise to a low velocity whereas it would normally achieve the usual velocity. This doesn't sound likely to me.

Mr. Roffman. O.K., Now, the otherwise pristine condition of 399 plus the dent in the back - do you think this dent in the back and the loss of some of the core, here, indicates that it did more damage than just penetrate the President's back?

Mr. Dickey. No, I don't think I could answer that.

Mr. Roffman. Do you think it is possible, then, that this little dent here and this piece of core that was removed could be accounted for by the bullet passing through a tree, not through the trunk of a tree but going through its branches? Do you think it is possible that its hitting a branch could cause that?

Mr. Dickey. I suppose it's possible. That's about it.

Mr. Lennox. You're going into conjecture there.

Mr. Roffman. Now....let me try to word this correctly.

Mr. Lennox. Charlie, off the record, wouldn't it - hasn't it been your experience that where you find a case with a mouth dent that at the time of firing that would have almost had to have been perfectly round because of pressure. You'd have a tendency to strech at that point.

Mr. Dickey. The mouth dents after firing generally occur because the case has struck something there. We know by inspection that the rounds are perfectly formed; the bullet is round and there are no obvious defects of the mouth of the cartridge case and in other words the rounds would fire in good shape and they would not be like that. The bullets would not be squeezed as such a mouth would indicate. If that were the case, you wouldn't expect that round to chamber. I mean if the bullet were misshapen like this, it wouldn't chamber or it would chamber very difficultly, very difficultly. Or you might even not be able to send it home by means of a bolt action rifle.

Mr. Roffman. Now, in firing, I imagine that the bullet becomes quite hot. Would the temperature increase to the extent that the lead would be softened between the time that the firing pin hits the bullet and the time that the bullet takes off from the rifle?

Mr. Dickey. We have no evidence to indicate that lead ever becomes molten or that it doesn't. It's possible that it could. Sometimes we have our jubbing metal sometimes liquifies but you can't be sure of that. By and large we'd expect that lead probably would not liquify because the time duration is so short. Probably not.

Mr. Roffman. Do you think it's possible then that after leaving the rifle barrel that the back of the bullet expanded - stretched out because obviously in its present state, since it is flattened, it would be too wide to fit into the barrel?

Mr. Dickey. This is always possible theories. You have a picture of a misshapen projectile which probably wouldn't fit anyway and even fired projectiles do not have a degree of stability which would enable them to be moved easily through a barrel once they've been fired. But it's also possible for the base of the bullet to open up a little bit as a result of firing because the gases, the high pressure gases, might have gotten caught in there and at the point of launch from the muzzle would expand in trying to leave the bullet. This is sometimes possible.

Mr. Roffman. Do you think that this would be consistant with what is dipicted in this picture of 399?

Mr. Dickey. One would not say that that did not happen in a case like that. In a well made bullet that would not happen but I couldn't say that it didn't happen there.

Mr. Roffman. Then the damage to the back of this bullet isn't neccessarily consistent - wouldn't necessarily have been caused by hitting bone or passing through a body, then?

Mr. Dickey. More than likely the damage that you see here would have occurred under those circumstances which - it probably would not have occurred as a result of just having been fired and caught in the air, if you will. You mean in a medium which would not be expected to damage the bullet whatsoever.

Mr. Roffman. Then are you saying that this damage is more likely been caused by passing through bone than....

Mr. Dickey. No, I wouldn't say that. I'd say the damage caused there by passing through a body but probably not through bone.

Mr. Roffman. Then are you saying that the damage was too little to have been passed through bone?

Mr. Dickey. Not of a certainty. But most likely, yes.

Mr. Roffman. Is it of any significant value that this bullet was fired through a wrist (showing ridture of C.E.853), with the same type of ammunition fired from the same rifle and emerged in this condition? This bullet was fired through a goat's chest (showing picture of C.E.856). It hit the rib in an almost identical manner that the Governor's was hit. It emerged flat, especially in the middle, with its core extruding like that. Now this bullet was fired into a skull and of course it's torn from its nose down with its core completely out (showing picture of CE857). Now there's another bullet, too, which I haven't shown you yet. This was found in General Walker's house (showing picture of CE573). There's no - it most likely came from Oswald's rifle and it hit the wall. It hit the cement - it hit a cement wall and this was the bullet, right here. Now these two bullets were fired for test purposes (showing picture of CE572). They were fired into long, cotton tubes. Now, one of them, it's this one I think, came out a little bent. You can see it better in the actual bullet. In fact, there's a comparison photo, here (showing pictures on page 152 of Six Seconds in Dallas). This is the wound in Governor Connally's wrist; this is the bullet that alledgedly did it. This is the wound produced on a cadaver's wrist and this is the bullet that did produce it. Now here's 399 and here's the two test bullets that were fired. Now obviously from this photo and comparing them at the Archives, which I did, 399 seems more similar in all characteristics to these two bullets than to any of the other bullets fired for test purposes - through the goat chest, through the rib. The bullet from the neck was never admitted into evidence. Do you think that is significant or bears on whether 399 did penetrate bone or not? As to what damage 399 did inflect?

Mr. Dickey. Well, I believe that we're going around in circles. I think that I have essentially answered that question. I'll try to do it again.

As I pointed out before, I think that It's possible that the rear damage to the bullet varies statistically and that a bullet need not hit a bone to damage it or break it - to splinter it and so it could go through only the fleshy part of the body, still break bones but never strike the bone and still perhaps emerge reasonably intact. That's what I'm saying. It's not impossible for that bullet to have done all that is claimed. Again it isn't really very likely but I wouldn't put it outside the realm of possibilty.

Mr. Roffman. Perhaps you can't answer this again but if given the two hypotheses: (1)that this bullet went through both men causing the damage that has already been stated, and (2)that it just lodged in the President's back that short distance, do you think that any one is more plausible judging from the condition of this bullet?

Mr. Dickey. Are you asking me if - which of these two hypotheses are more plausible? The one that would be more plausible would be the one that just lodged in the back.

Mr. Roffman. Why would that be more plausible?

Mr. Dickey. Because the relative condition of the bullet, but as I say either one is not outside the realm of possibility.

Portion of transcript relating to head movement deleted because Mr. Dickey expressed opinion that he was not qualified to give testimony on this point.

Mr. Roffman. What about the distribution of the fragments and tissue matter resulting from the explosion? Would they all be expected to move foward as a result of this explosion from a shot entering from the rear and exploding after entering (referring to head shot)?

Mr. Dickey. Well now, when you speak of exploding; it doesn't really explode in the normal sense because there's no high explosives in the projectile to cause it to explode normallly. It's just that pressure built up strongly as a result of firing will cause it to break apart. They may call it explosion there but that really isn't the correct terminology.

Mr. Roffman. What would be the correct terminology?

Mr. Dickey. I don't know what I'd call it. Explosion - we normally use - we speak of energy being released in a very sudden fashion and.....

Mr. Roffman. Let me give you again a hypothetical situation and see if you can evaluate this. That a bullet is fired at 265 feet from the window in a fashion like this: it is fired from here (far east sixth story window on south side of TSBD) and strikes the President here (position of President in frame 313) on Elm Street. The angle would be between 13 and 15 degrees to the car. Now, after - the bullet entered at a portion of the skull that is considerably thicker, the occipital protuberance and it's considerably thicker than most areas of the skull since the skull is relatively thin. Now, it entered not only on an angle but the President's head was considerably bent down whcih would increase the angle greatly. Now, a doctor testified before the Commission that this was a tangenical striking where because of the angle much more energy is released. Now, after entering from this release of energy that the bullet - is it possible for the bullet to- then suddenly because of this release of energy - I can't think of any other word except explode?

Mr. Dickey. Breaks apart? Is this what you mean?

Mr. Roffman. Yes. With a great force. I mean enough to blow out the side of the President's head.

Mr. Dickey. Well, it wouldn't break apart. It has partial - quite a bit of energy of the natural energy of the projectile.

Mr. Roffman. Would it be natural for it to break apart like that after entering on the conditions I have described or would you expect it to exit from the skull relatively undistorted?

Mr. Dickey. I'd expect it to break apart but it might not.

Mr. Roffman. This is again hypothetical. Do you think that a fragment would still have enough energy - now this would be a tiny fragment of the core - would still have enough energy to go on 265 feet to a position here and rickochet off the curb a few feet. Because during the assassination, a bystander standing here right near the overpass on Commerce Street was wounded on the cheek by either a little piece of curb or a little metal fragment and the rickochet mark was found on the curb here - very tiny. Spectrographic analysis showed it to be lead. Now, is it possible, at all possible, that from the shot that hit the President in the head broke up blowing out the right side of the President's head but still in this right to left direction, is it possible that one fragment continued on some 265 feet with enough energy to rickochet off the curb?

Mr. Dickey. How large was that fragment?

Mr. Roffman. It would be very tiny, very tiny.

Mr. Dickey. Would you have any idea of how many grains it was?

Mr. Roffman. Possibly 1 or 2 but that would be speculation. It left a small mark and it didn't break off any of the curb. It just left a mark on the curb.

Mr. Dickey. I would rather expect that a one or two grain fragment would not have very much energy at that point - would not be expected to do very much in the way of damage at all.

Mr. Roffman. How big would you say a fragment would have to be in order to travel that distance and still have enough energy to rickochet off the curb?

Mr. Dickey. Leaving a mark. I don't know.

Mr. Roffman. Do you think it's possible that a fragment from this shot could have done that?

Mr. Dickey. Well, I'd say it's not impossible. I'd expect it to be a larger fragment than a one or two grain fragment.

Mr. Roffmen. Do you think it's unlikely?

Mr. Dickey. It is unlikely.

Mr. Roffman. Now also, considering this....

Mr. Dickey. Excuse me. For a small fragment. A bigger fragment, why, it isn't quite so unlikely.

Mr. Roffmen. Here is a better representation. This is a picture of the mark on the curb. It's upsidedown the way it's printed there. That's the mark that was produced. No concrete was removed. It just left a smear on the curb. And this is tracing the trajectory there, page 230 of Thompson's book. Does that change your opinion any as to the likeliness of it?

Mr. Dickey. It's possible. It's possible, yeah.

Mr. Roffmen. Now, consider too that the two fragments that I showed you that were - these two fragments (showing pictures of CE's 567 & 569). They were found on the front seat of the car and they originated from the head shot more than likely because it doesn't seem there's any other shot they could have originated from. They were found on the front seat and no damage was done to the front seat. How is it possible that two fragments like that could have lost all that velocity so that they just travelled to the front seat and did no damage to it while another went on all this distance to cause the mark on the curb. And also too it should be noted that alittle tiny fragment went on to the windshield to crack the windshield a little bit. It caused a little nick in the windshield. There's a picture of that here, right here (showing CE 350).

Mr. Dickey. Well you see, all these pieces, you're looking at them long after they've spent all their energy. They're distributed here, there, everywhere. And if you find these in the bottom of the - bottom of the car, on the floor....

Mr. Roffman. Front seat.

Mr. Dickey. Front seat, means that they have lost all of their energy somewhere and they dropped down there. The other particles that nicked the windshield and went on to strike the curb and leave a mark there means that they did not lose all their energy right in that area but had....

Mr. Roffman. Is it still possible that from one bullet some fragments would lose the energy and some wouldn't?

Mr. Dickey. Yes. It's possible.

Concluding portion of transcript relating to rifle capability deleted because it bears little significance to this investigation.